Reproductive Compatibility Between Two Widely Separated Populations of *Pyemotes scolyti*

(Acarina : Pyemotidae)

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Pyemotes scolyti (Oudemans) (1936) is an external parasite of *Scolytus* spp., and apparently occurs throughout the range of *Scolytus*. It was described from specimens reared on *Scolytus multistriatus* (Marsham) in elm near Arnhem, Netherlands, and designated by Krczal (1959) as the genotype.

Specimens of *Pyemotes scolyti* reared from galleries of *Scolytus ventralis* LeConte in *Abies grandis* collected near Moscow Mountain, Idaho, were recently forwarded to us for identification by Alan A. Berryman and Bernard Scott. Although the material was morphologically inseparable from that taken in galleries of *Scolytus multistriatus* in *Ulmus americana* from Delaware, Ohio (det. E. A. Cross), the possibility still remained that the two populations might be cryptic species similar to those found for spider mites by Boudreaux (1963).

METHODS

Five mothers were reared from each population and five female and male progeny from each mother were selected for cross matings. Thus, 25 virgin females reared from 5 mothers of the "ventralis" strain were mated with 25 males from the "multistriatus" strain and their hybrid progeny tallied. A similar cross was then made using females of the "multistriatus" strain and males of "ventralis" strain.

Since the first individual born is usually a male, care had to be exercised in the cross matings to see that these and any subsequent males were immediately removed so as not to interfere with the mating activities of males from the opposite strain. Test males were identified by a small paint droplet on a seta (Moser and Roton, 1970).

RESULTS AND DISCUSSION

The data in Table 1 show little reproductive isolation between the two populations, and indicate that they are indeed the same species. However, some genetic breakdown may have occurred in the male "multistriatus" × female "ventralis" cross. Although the progeny

TABLE 1. Number of F_1 progeny of "ventralis" and "multistriatus" strains of *Pyemotes scolyti*.

Strain	n	Progeny (F_1)							
		Mean		Standard deviation		Maximum		Minimum	
		♀	♂	♀	♂	♀	♂	♀	♂
Ventralis (mated)	20	94.5	2.1	30.5	1.0	152	5	40	1
Ventralis (unmated)	5	–	63.8	–	46.8	–	135	–	21
Multistriatus (mated)	20	120.6	2.0	20.8	1.6	168	4	59	1
Multistriatus (unmated)	5	–	23.6	–	4.8	–	31	–	19
♂ Multistriatus × ♀ Ventralis	25	106.0[1]	1.1[2]	30.8	0.4	174	50	2	1
♂ Ventralis × ♀ Multistriatus	25	96.9[1]	1.3[3]	28.5	0.6	168	48	3	1

[1] Hybrid females.
[2] "Ventralis" males.
[3] "Multistriatus" males.

count was normal, males did not appear until about 75 percent of the females had been born. In addition, one preliminary rearing resulted in 9 of 20 mothers producing normal numbers of females, but no males. Production of all-female progeny in *Pyemotes parviscolyti* Cross and Moser was induced by restricting the feeding period of mothers to 3 days (Moser, Cross, and Roton, 1971). In *Pyemotes scolyti*, the virgin females are normally fertilized as they emerge tail first from the birth canal. The male is embedded head first in the canal and mating occurs as the female abdomen tip slides past the male abdomen. Males extracted from the birth canal behaved in a manner similar to that described by Krczal (1959). They mated with virgin females, but only with difficulty. They reentered the canal as soon as possible, usually mating with only a few of the available females. Normally, males leave the birth canal when they are pushed out by the next male to be born. Occasionally, males left the canal for no apparent reason, but in both cases, they usually died within 12 hours, and never were observed to reenter the canal. In at least 3 cases where virgin females were present when males left the canal, no matings took place. Hence, any females born before the first male emerge unfertilized, and probably remain so even when males are born later. Thus, in the male "multistriatus" × female "ventralis" matings, there was a 75 percent loss in reproductive potential of progeny.

Virgin females of both populations were reluctant to attack the host, *Scolytus multistriatus* larvae. When they did, swelling was usually minimal, resulting in a reduced number of progeny, all of which were male. As Boudreaux (1963) showed in his experiments with tetranychid mites, rearing through the F_2 generation is not necessary to show reproductive isolation in species exhibiting haplo-diploid parthenogenesis (arrhenotoky) such as we observed. Since the F_1 males carry the same genes as the female parent, the F_2 generation is really a backcross of the F_1 generation and not a true F_2 cross. Therefore, the F_2 generations will exhibit an average of characters closer to the average original female parent, and succeeding generations will even be more biased.

Cross (1965) notes that many pyemotids, due to their small size, are cosmopolitan within their ecological limits, and that greater morphological variation may occur between nearby localities than between continents. Perhaps this phenomenon also applies to breeding barriers between widely separated populations of *Pyemotes scolyti.*

The "multistriatus" population is probably of European origin and introduced with the elm bark beetle sometime prior to 1909. The "ventralis" population may or may not be native, but the formidable ecological barriers between the host beetles make it unlikely that this population was recently derived from the "multistriatus" population.

Acknowledgments

We thank Drs. H. B. Boudreaux and E. A. Cross for interest and advice on methodology. We also thank Dr. Alan Berryman, Mr. Bernard Scott, Dr. Bruce H. Kennedy, and Dr. John W. Peacock for collecting the mites and bark beetles used in the study.

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